A New Generalized Equation of State for Alternate Refrigerants

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We have developed a new generalized equation of state for refrigerants with the emphasis being placed on alternate refrigerants. The equation has been developed by applying a stepwise regression/threshold acceptance program to a Carnahan-Starling Helmholtz base function. As such it is an extension of the Carnahan-Starling-deSantis equation of state that has been very successful in representing refrigerant properties. A unique feature of this new equation of state is that it has an explicit (universal) square-well second virial coefficient dependence, thereby simplifying the attractive terms in the equation of state. The fluids that have been used to develop the equation of state include R123, R125, R134a, R143a and R152a as well as R32.

In this presentation, we will describe the development of the generalized equation of state and present the results of comparisons of the model with the base data and other pure-fluid refrigerant data. The extension of the equation to mixtures will be briefly discussed, and preliminary phase equilibrium and single-phase property predictions will be compared to experimental data.